CLAIMS

We claim:

1. An apparatus for identifying a chemical moiety from a sample solution, comprising:

   (a) a substrate having a channel with at least one array for capturing a chemical moiety from a sample solution; and
   (b) a nanopore system downstream from the substrate for identifying the chemical moiety received from the substrate channel after the chemical moiety has been released from the array.

2. An apparatus as recited in claim 1, where the channel is a micro fluidic channel.

3. An apparatus as recited in claim 1, wherein the array comprises a probe.

4. An apparatus as recited in claim 1, wherein the probe comprises a nucleic acid molecule.

5. An apparatus as recited in claim 1, wherein the probe comprises a protein molecule.

6. An apparatus as recited in claim 1, wherein the probe comprises a carbohydrate.

7. An apparatus as recited in claim 1, wherein the probe comprises a polysaccharide.

8. An apparatus as recited in claim 1, wherein the substrate comprises a material selected from the group consisting of silicon, plastic, rubber, glass, metal, and combinations thereof.

9. An apparatus as recited in claim 2, wherein the smallest dimension of micro fluidic channel is 100 microns or less.

10. A method for separating and identifying a chemical moiety, comprising:

    (a) contacting a solution comprising a target molecule to a probe positioned in a channel of a substrate;
    (b) capturing the target molecule from the sample by contacting the target molecule to the probe;
    (c) releasing the target molecule from the probe in a defined order; and
    (d) identifying the target molecule by a nanopore system.

11. A method as recited in claim 10, wherein the order of release of the target molecule is the same as the order of binding of the target molecule to the probe.

12. A method as recited in claim 10, wherein the order of elution of the target molecule is opposite of the order of binding of the target molecule to the probe.

13. An apparatus as recited in claim 1, wherein the target comprises a nucleic acid molecule.

14. An apparatus as recited in claim 1, wherein the target comprises a protein molecule.

15. An apparatus as recited in claim 1, wherein the probe comprises a carbohydrate.

16. An apparatus as recited in claim 1, wherein the target comprises a polysaccharide.

17. An apparatus as recited in claim 1, wherein the channel comprises a small enough size to allow the target to elute off of the probe without altering the linear binding order.

18. An apparatus of claim 1, wherein the array comprises more than 10 features.

19. An apparatus of claim 1, wherein the array comprises more than 100 features.

20. An apparatus of claim 10, wherein the substrate may be flexible or rigid.

21. An apparatus of claim 1, which further comprises valves in the channel that permit different fluids to be directed into the channel.

22. An apparatus of claim 1, which further comprises a temperature control device to provide a temperature controlled environment.

23. An apparatus of claim 10, which further comprises means to move the fluids through the array.

24. A method as recited in claim 10, wherein the step of releasing the target molecules involves heating portions of the array.

25. A method as recited in claim 10, wherein the target molecules are not labeled prior to introduction to the array.

26. A method as recited in claim 10, wherein the solution contacting the probes may comprise target molecules from more than one sample and the samples are differentially labeled.